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Sun and shade leaf variability in Liquidambar chinensis and Liquidambar formosana (Altingiaceae): Implications for palaeobotany

Maslova N., Karasev E., Kodrul T., Spicer R., Volkova L., Spicer T., Jin J., Liu X.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2018 The Linnean Society of London. Many factors influence leaf anatomy and morphology in the crown of a tree, particularly those resulting from microclimatic differences between the periphery and the interior of the crown. These influences can be so strong that single species can produce different leaf forms in which shade and sun leaves exhibit consistently distinctive morphological and epidermal character sets. Here we show, using Liquidambar as a model system, that the principal morphological characters for distinguishing shade and sun leaves in two modern Liquidambar spp. with different lamina types (entire in L. chinensis and lobate in L. formosana) are the leaf lamina length to width ratio, the degree of development of venation networks, tooth size and tooth shape. The main epidermal characters are ordinary cell size and anticlinal wall outlines. Many fossils, however, are only preserved as impressions and morphological characters alone have been used to distinguish shade and sun leaf morphotypes. To evaluate the utility of our approach, populations of fossil Liquidambar leaves from the Eocene of southern China, preserved only as impressions, were categorized into sun and shade morphotypes. Recognition that sun and shade leaf morphological diversity exists in fossil populations will enable palaeobotanists to identify more reliably foliar polymorphisms that would otherwise be used to describe, incorrectly, different species.

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Keywords

Epidermal characters, Fossil leaves, Leaf morphology, Statistics

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